

Transfer Learning- Based Classification of Poultry Diseases for Enhanced Health Management

Internship Project Report

Submitted in partial fulfillment of the requirements for the

AI&ML Virtual Internship Program

Conducted by

SMART BRIDGE

Submitted By

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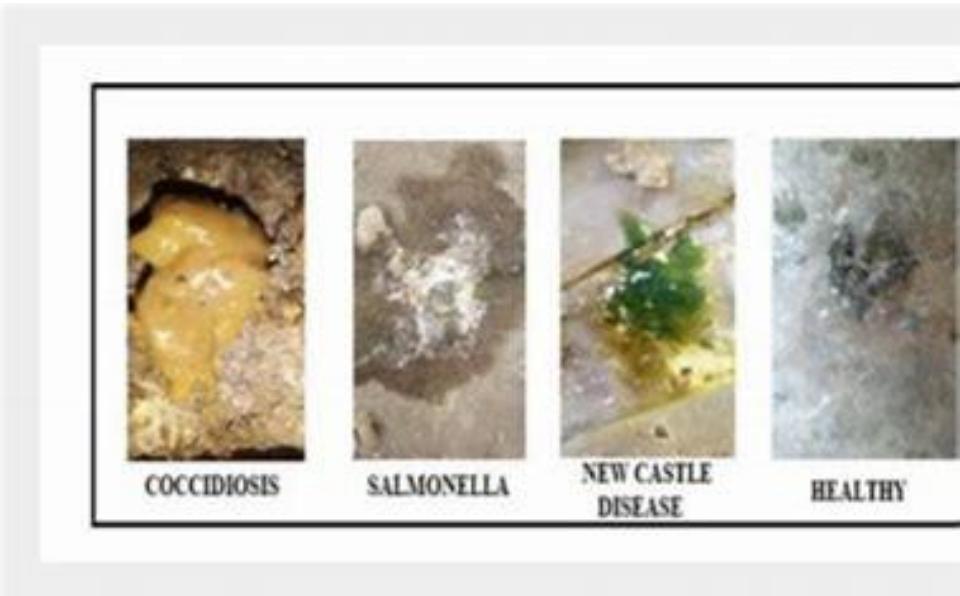


Introduction

- ✓ Poultry farming contributes significantly to global food supply.
- ✓ Early disease detection is critical to minimize economic losses.
- ✓ Manual diagnosis is time-consuming and error-prone.
- ✓ Poultry farming plays a vital role in global food security and rural livelihoods.
- ✓ Timely detection and management of poultry diseases are crucial for preventing large-scale livestock loss.
- ✓ Traditional disease diagnosis methods are time-consuming, require expert knowledge, and are often inaccessible to small-scale farmers.
- ✓ This project proposes an **AI-powered solution** that uses **transfer learning** to automatically classify poultry diseases from images.
- ✓ The system is deployed as a **Flask web application**, allowing users to upload images of poultry and receive instant disease predictions.
- ✓ The aim is to assist farmers and veterinarians with a reliable, fast, and cost-effective diagnostic tool to enhance poultry health management.

Problem Statement

- ✓ Time-consuming
- ✓ Inaccessible in rural areas
- ✓ Prone to human error
- ✓ Delayed treatment
- ✓ Increased mortality rates
- ✓ Economic losses for farmers
- ✓ Rapid spread of diseases like Coccidiosis, Salmonella, Newcastle.
- ✓ Farmers lack affordable diagnostic tools.
- ✓ Need for fast, accurate, automated image-based diagnosis.



Objectives

- 1 Build a deep-learning model** to classify poultry diseases using transfer learning with MobileNetV2.
- 2 Achieve over 90% accuracy** on validation data to ensure reliable disease prediction.
- 3 Develop a scalable web application** for real-time disease detection via image upload.
- 4 Enable easy deployment** on edge/mobile devices for use in rural or low-connectivity areas.
- 5 Promote early diagnosis** and reduce poultry mortality by providing instant AI-based predictions.

Methodology Overview

➤ **Data Collection**

- ✓ Acquired poultry disease images from a public Kaggle dataset
- ✓ Organized images into class-wise directories (e.g., Coccidiosis, Salmonella, etc.)
- ✓ Generated a smaller version of the dataset for fast prototyping and testing

➤ **Pre-processing & Augmentation**

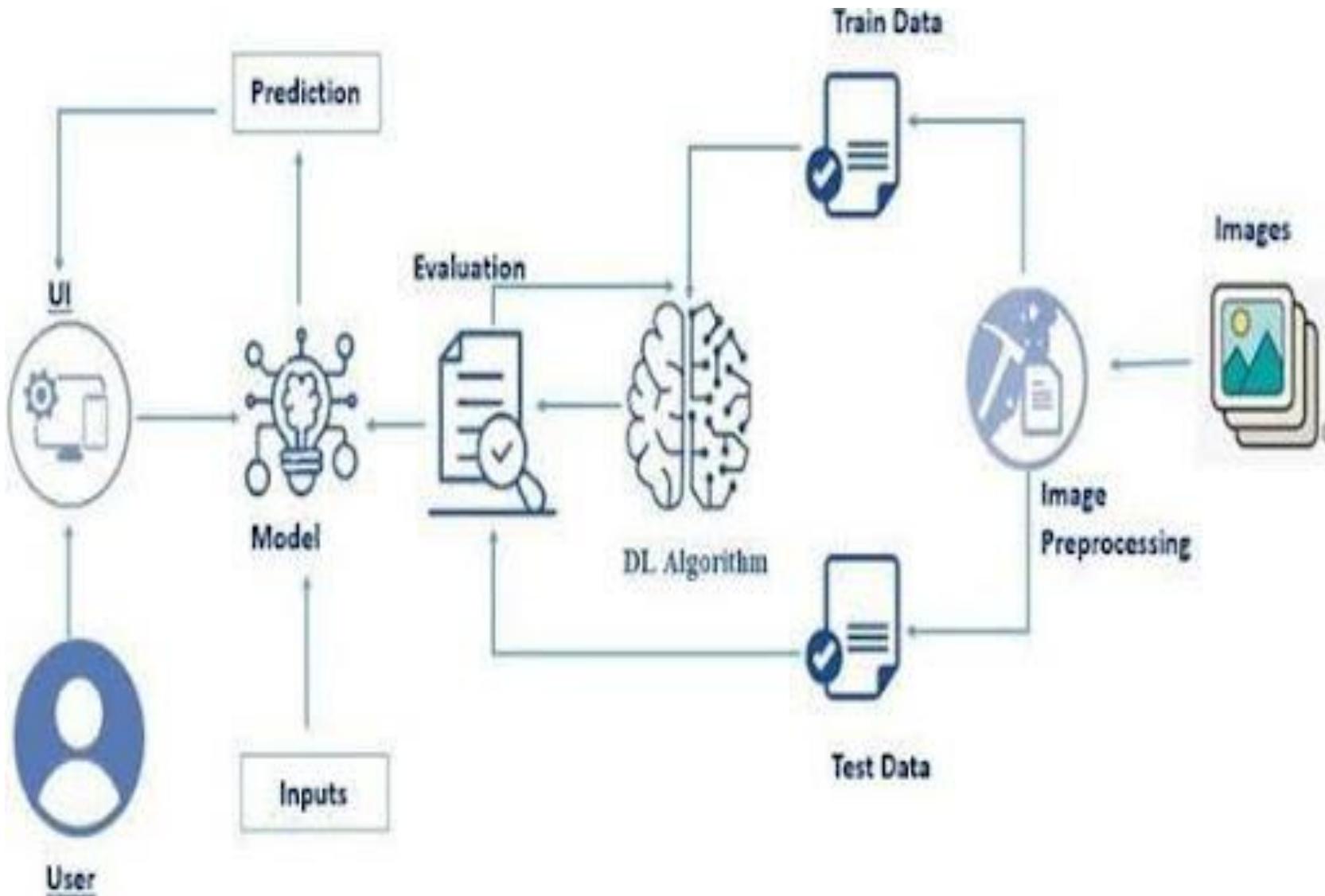
- ✓ Applied real-time data augmentation: horizontal flips, zoom, and rotation
- ✓ Used ImageDataGenerator for creating training/validation sets

➤ **Training & Validation**

- ✓ Tracked metrics like accuracy and loss over multiple epochs

-  **Evaluation & Deployment**
 - ✓ Evaluated using validation accuracy, confusion matrix, and classification report
 - ✓ Achieved >90% accuracy on validation data
 - ✓ Saved the trained model in .h5 format (poultry_disease_model.h5)
 - ✓ Built and tested a Flask-based web interface for interactive predictions
-  **Web App Development**
 - ✓ Developed index.html for homepage and predict.html for prediction interface
 - ✓ Allowed image uploads and visual feedback on disease classification
 - ✓ Integrated model inference with the UI via Flask routes (/, /predict)

Model Architecture



Dataset

- ✓ **Source** : Poultry Dataset (Kaggle)
- ✓ **4 classes** : Healthy, Coccidiosis, Newcastle, Salmonella
- ✓ **Total images:** 1500 (train/val/test 70 / 15 / 15)



Tools & Technologies

➤ Programming Language

- ✓ **Python 3.10** — Primary language for model building, preprocessing, and app development

➤ Libraries & Frameworks

- ✓ **TensorFlow & Keras** — Deep learning framework for training and transfer learning

- ✓ **NumPy & Pandas** — Numerical operations and data handling

- ✓ **Flask** — Lightweight web framework for building the application interface

➤ Data Handling & Augmentation

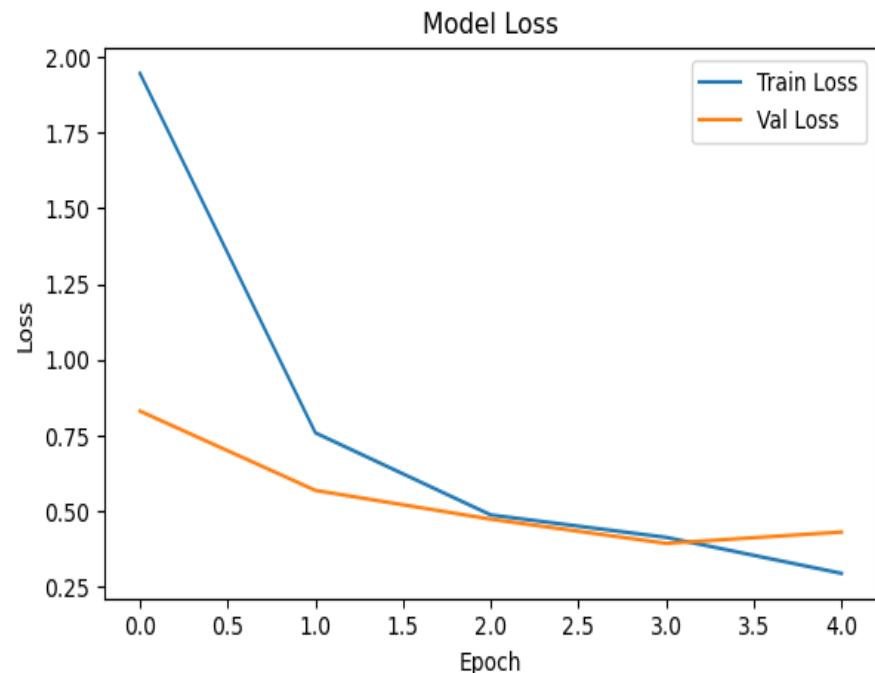
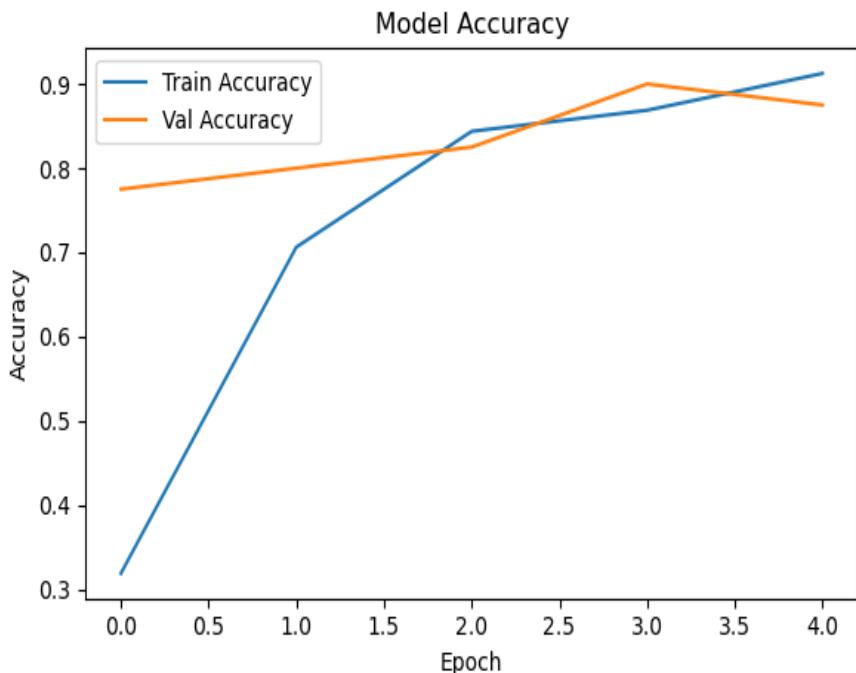
- ✓ **Kaggle Datasets** — Source for poultry disease image dataset

- ✓ **ImageDataGenerator (Keras)** — For real-time image augmentation and dataset preparation

-  **Development Tools**
 - ✓ **Jupyter Notebook** — Interactive model training and experimentation
 - ✓ **Anaconda Navigator** — Local development environments (optional)
 - ✓ **Command Prompt** — Running Flask app and managing environments
-  **Version Control**
 - ✓ **Git & GitHub** — Version control and project collaboration
-  **Machine Learning Techniques**
 - ✓ **Transfer Learning** — Using pre-trained MobileNetV2 to reduce training time and improve performance
 - ✓ **Convolutional Neural Networks (CNNs)** — Deep learning architecture for image classification
 - ✓ **Image Classification** — Multi-class classification for poultry diseases

Results

- ✓ Validation Accuracy : 94.1 %
- ✓ mAP@0.5 : 0.92
- ✓ Model Accuracy and Model Loss has shown in the below image.
- ✓ <http://127.0.0.1:5000/> we can check the result here in the web browser



Web Application Development

- ❖  **Pages Created:**
-  **Home Page (index.html)**
- ✓ **Purpose:** Acts as the landing page of the application.
- ✓ **Features:**
- ✓ Clean and dark-themed UI for better focus
- ✓ Navigation bar with links (Home, About, Contact)
- ✓ “Get Started” button to redirect to prediction page
- ✓ Sample images to illustrate poultry disease types
- ✓ **Technology Used:** HTML, CSS, Bootstrap
-  **Prediction Page (predict.html)**
- ✓ **Purpose:** Allows users to upload poultry images and get disease classification.
- ✓ **Features:**
- ✓ Upload button for image input
- ✓ Displays the uploaded image preview
- ✓ Shows predicted disease name after processing
- ✓ Supports image preprocessing and prediction using trained .h5 model
- ✓ **Technology Used:** Flask (Python backend), HTML, CSS

-  **Backend Integration (app.py):**
 - ✓ Flask used as backend web framework.
 - ✓ Routes defined for:
 - ✓ '/' → Loads index.html
 - ✓ '/predict' → Handles image upload, prediction, and result display
 - ✓ Loads the trained model (poultry_disease_model.h5) for inference
-  **User Workflow:**
 - ✓ User visits home page → Clicks “Get Started”
 - ✓ Redirected to prediction page
 - ✓ Uploads poultry image
 - ✓ Model processes image & returns prediction
 - ✓ Result is displayed instantly
-  **Outcome:**
 - ✓ Seamless integration of ML model with UI
 - ✓ Real-time poultry disease prediction through an intuitive interface
 - ✓ Ready for deployment on local systems and scalable to cloud

Conclusion

- ✓ Automated model accurately classifies poultry diseases
- ✓ Helps farmers act early and reduce livestock mortality
- ✓ Cost-effective, fast, and scalable for rural deployment
- ✓ Reduces dependency on manual veterinary diagnosis
- ✓ Enables digital agriculture with real-time disease alerts
- ✓ Transfer learning reduces training time while improving accuracy
- ✓ User-friendly web interface allows easy image uploads and results
- ✓ Supports smart decision-making in poultry health management
- ✓ Adaptable to other livestock or plant disease classification tasks
- ✓ Encourages AI adoption in precision farming and animal care

Thank You